Four New Species of *Nasa* ser. *Alatae* (Loasaceae) in the Amotape–Huancabamba Zone of Peru

Maximilian Weigend

Institut für Biologie–Systematische Botanik und Pflanzengeographie, Freie Universität Berlin, Altensteinstr. 6, D-14195 Berlin, Germany. weigend@zedat.fu-berlin.de

ABSTRACT. Four new species of *Nasa* ser. *Alatae* (Urban & Gilg) Weigend are described from the Amotape–Huancabamba Zone in northern Peru. The new species *Nasa stolonifera* has extensive underground stolons and forms clonal stands, whereas *N. victorii* has angular stems with elevated longitudinal ridges. New species *Nasa pongalamesa* and *N. lambayequensis* are closely allied to *N. carnea* from northern Peru and *N. loxensis* from Ecuador. *Nasa amaluzensis* Weigend, previously only known from the type collection in southern Ecuador, is reported as new to the Peruvian flora. The flowers of *Nasa* ser. *Alatae* are discussed as funnel-revolver flowers, based on their morphology. A distribution map of the newly described taxa and a key to all known species of *Nasa* ser. *Alatae* in Peru are provided.

Key words: Amotape–Huancabamba Zone, funnel-revolver flower, Loasaceae, *Nasa* ser. *Alatae*, Peru.

A revision of *Nasa* ser. *Alatae* in Peru was recently provided together with an overview of its morphology and ecology (Weigend, 2000a). *Nasa* ser. *Alatae* was originally described as *Loasa* subg. *Loasa* ser. *Alatae* Urban & Gilg (Urban & Gilg, 1900), but has since been removed to the new genus *Nasa* and includes the type of this genus (*Nasa rubrastra* (Weigend) Weigend). *Nasa* ser. *Alatae* is closely allied to *Nasa* ser. *Grandiflorae*, and its precise limits are currently under investigation (Weigend et al., in prep.). Both groups share more or less campanulate corollas usually with yellow, red, or orange petals and floral scales with distinct apical wings.

The series as currently defined comprises ca. 27 species, which range throughout the northern and central Andes (southern limit in south-central Peru with an outlier in northern Bolivia) and are usually restricted to the moister eastern slopes in the drier central Andes. The geographical range has been recently expanded northward by the description of a new species from Central America (*N. panamensis* Weigend, Weigend, 2002b). The species here described reported from Peru bring the species total of *Nasa* ser. *Alatae* in the strictest sense (i.e., sensu Urban & Gilg, 1900) up to 17 from 13 in the year 2000, and an original number of only 5 species before the beginning of the current revisionary effort. The species totals known for Colombia and Ecuador are 7 and 8, respectively, so that Peru now houses more than twice as many species as each of these other two countries. This has nothing to do with the different sizes of the countries, since *Nasa* ser. *Alatae* in Peru is largely restricted to the northern part and there mostly to the eastern cordilleras, i.e., an area substantially smaller than their range in Ecuador and Colombia.

MATERIALS AND METHODS

New collections were obtained during field studies in Peru in October 2000 and March–April 2001 in addition to the collections cited in Weigend (2000a); vouchers are cited under the respective species below. Pressed specimens, FAA-material, and photographs are available from these collections. Duplicates have been sent by Asunción Cano E. from USM, Segundo Leiva G. (Herbario de La Universidad Antenor Orrega, Trujillo, Peru), and Víctor Quipuscoa S. from HUSA (Universidad Nacional de San Augustin, Arequipa, Peru). Also, two species, *N. olmosiana* (Killip) Weigend and *N. pongalamesa*, have been taken into cultivation in Berlin.

NASA SER. *ALATAE* IN THE AMOTAPE–HUANCABAMBA ZONE

The Amotape–Huancabamba Zone has been postulated as a particular center of diversity for the Loasaceae (Weigend, 2002a), and this fact is further underscored by the four new species and the new record. All five species here discussed are found in the area called the Amotape–Huancabamba Zone (Fig. 1, Ayers, 1999; Berry, 1982; Young & Reynel, 1997) and close apparent distribution gaps of *Nasa* ser. *Alatae* (Weigend, 2000a). The species show the narrow endemicity and morpho-

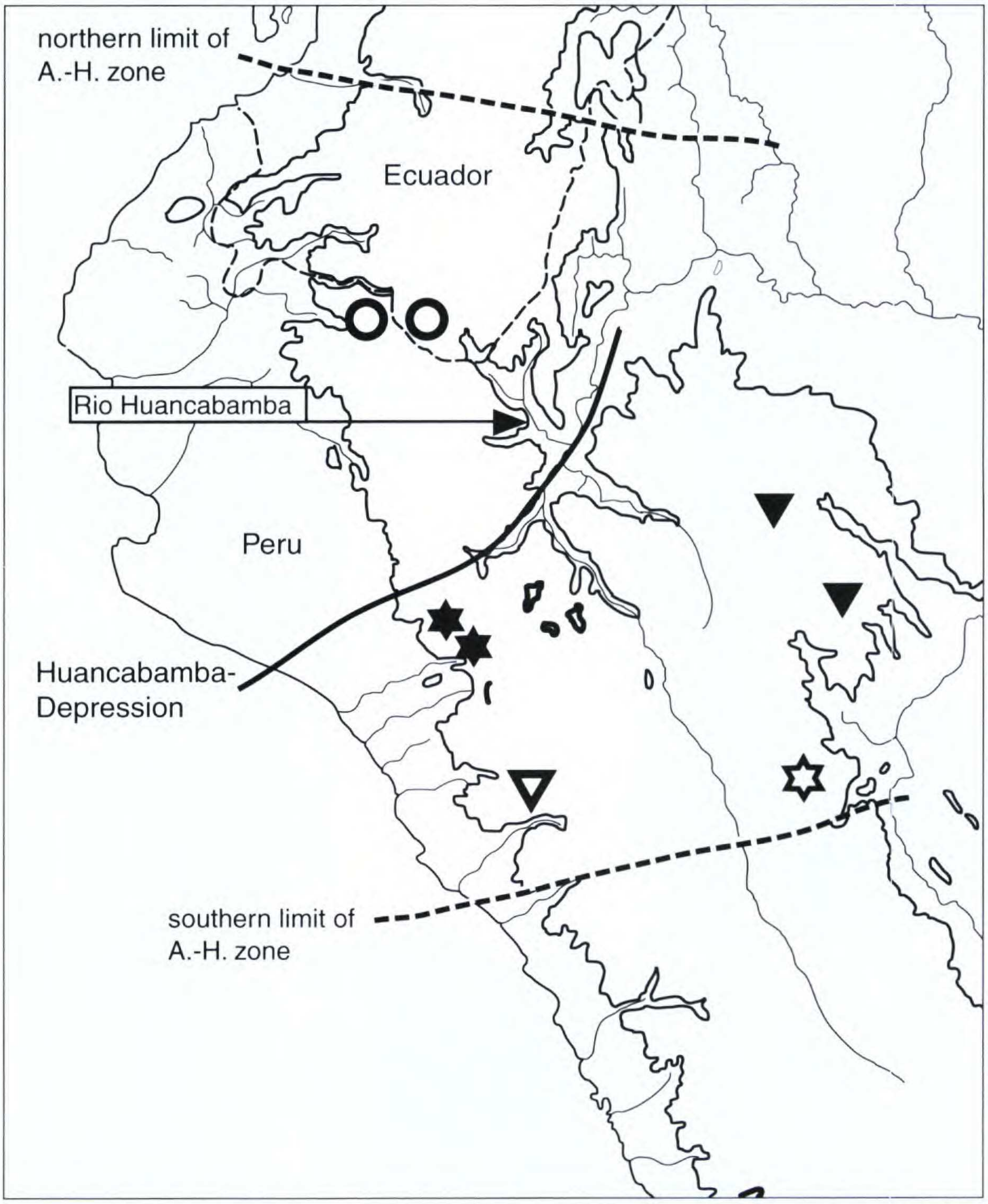

Figure 1. Distribution of the newly described and the newly reported species of *Nasa* ser. *Alatae*. Bold circles: *Nasa amaluzensis* (Weigend) Weigend; black stars: *Nasa lambayequensis*; empty star: *Nasa stolonifera*; inverted black triangles: *Nasa victorii*; inverted empty triangle: *Nasa pongalamesa* (map modified from Weigend, 2002a).

logical divergence that is so typical of many plant species in this geographical region. A total of 14 of the 17 species of *Nasa* ser. *Alatae* known from Peru are endemic to the Peruvian part of the Amotape–Huancabamba Zone, another 3 species are found in both the Ecuadorean and the Peruvian part of the Amotape–Huancabamba Zone, and 1 species is endemic to the Ecuadorean part of the Amotape–Huancabamba Zone. This means that more than 50% of all the known species of *Nasa* ser. *Alatae* are restricted to that relatively small zone, in spite of the fact that the group is widespread and ranges from central Peru to Panama.

Nasa ser. *Alatae* comprises mostly narrowly endemic species, and all the newly described taxa fall into that category. In some cases apparent narrow endemicity may reflect a lack of collecting, especially in the poorly known cloud forests on the eastern slopes of the Andes. This is borne out by the fact that some species previously known from only one locality have now been recollected at different places (e.g., *N. lenta* (Urban & Gilg) Weigend). *Nasa* ser. *Alatae* are usually plants from cloud and mistbelt forests, with only very few species ranging either into paramo habitats (e.g., *N. loxensis* (Kunth) Weigend from Ecuador, the new species *N.*

Figure 2. *Nasa pongalamesa* Weigend. —A. Young plant showing typical decussate phyllotaxy of series *Alatae*. —B. Flower, lateral view, showing dense cover with black stinging setae. —C. Flower, male phase, showing numerous stamens in the center of the flower. —D. Ovary with dense cover with black stinging setae. —E. Stinging hairs on back of petal. —F. Stamens and floral scales in old flower (female phase), showing the funnel-shaped scale apices giving access to the nectar. —G. Floral scale, full dorsal view with basal sacs, scale back, and apical wings. —H. Base of floral scale showing dorsal sacs with their oblique folds. —I. Apical part of floral scale showing recurved scale neck and apical wings. —K. Papillose staminodes after removal of floral scale. —L. Densely setose ovary roof (androecium, scales, petals, and two sepals removed) surrounded by the white annular nectary. —M. Receptacle as in L, lateral view, showing the elevated ovary roof with black stinging setae, the thick, white annular nectary and the base of the style (*Weigend et al. 852C*, type material cultivated at Berlin).

pongalamesa) and into dry scree-slope habitats (*N. urentivelutina* Weigend).

Floral Morphology

The basic structure and terminology of the floral elements of *Nasa* ser. *Alatae* have been discussed previously (Weigend, 2000a) and are largely congruent with the morphology observed in *Nasa* ser. *Grandiflorae*. The finer detail, especially petal shape, color, and orientation, size and shape of the scale back, presence or absence of dorsal threads, and the orientation and shape of the apical wings are crucial for taxon delimitation. A detailed overview is here provided on the basis of photographs of cultivated *Nasa pongalamesa* (Fig. 2). The pentamerous flowers have a largely inferior ovary, five calyx lobes, and five membranaceous, shallowly cymbiform petals (Fig. 2B, 2C). The petals are usually setose on the back (Fig. 2C, 2E), but stinging hairs are usually densest on the ovary (Fig. 2D). The flowers are proterandric and the mature anthers are folded into the center of the flower during the male phase; during the female phase the stigma elongates and is then situated in the center of the flower, while the anthers have by then wilted (Fig. 2F). The floral scales seen from above (i.e., in the flower visitor's view) form a typical "revolver" (Fig. 2F), i.e., each scale apex forms a funnel (Fig. 2H, 2I) that guides the beak of visiting hummingbirds to the basal nectar reservoir (Fig. 2H).

The term revolver flower is generally used for flowers where there is more than one access point to the nectariferous part (Endress, 1994: 116). In *Nasa* ser. *Alatae* (and most Loasaceae subfam. Loasoideae) there are five nectaries, each covered by a floral scale and two staminodes, and thus each floral scale has to be probed to extract all the nectar from an individual flower. Each floral scale forms a distally widened funnel providing mechanical guidance to the nectaries and also ensuring direct contact of the beak or the head of the visiting hummingbird with either the anthers or the stigma. This is a very peculiar case of a revolver flower, and I would like to introduce the term funnel-revolver flower for this particular situation. The basal nectar sacs are not the place where the nectar is secreted; they only function as nectar storage containers. Nectar secretion takes place in five basal nectaries (Fig. 2L, 2M), and nectar is secreted between the bases of the two free staminodes (Fig. 2K) into the base of the nectar scale. The ovary roof, i.e., the receptacle within the nectary, is densely covered with stinging hairs (Fig. 2M), presumably to deter nectar theft by small insects, which could otherwise land on the nectar scales, climb onto the receptacle, and then remove the nectar from the scales without touching either anthers or stigmas.

Key to the Taxa of *Nasa* ser. *Alatae* in Peru

1. Calyx tube and fruit without stinging hairs . . . . . *Nasa anderssonii*
1′. Calyx tube and fruit usually densely covered with stinging hairs, at least in proximal portion 2
2(1). Stem with strongly elevated longitudinal ridges (usually 6); stinging hairs on ovary concentrated at base, distal portion with very few, or without stinging hairs . . . . *Nasa victorii*
2′. Stem terete, never with elevated ridges; stinging hairs ± evenly distributed on fruit, usually very numerous 3
3(2). Leaves pentagonous with acute leaf lobes; stem densely covered with uniseriate glandular hairs, especially in distal portion, setae 4–5 mm long; petals narrowly oblong and setose on back . . . . . *Nasa amaluzensis*
3′. Leaves ovate to widely ovate, if widely ovate then leaf lobes always rounded to acuminate; stem without or with few uniseriate glandular hairs, setae typically less than 4 mm long; lamina typically ovate, if subcircular in outline, then petals widely ovate to subcircular and esetulose on back 4
4(3). Corolla yellow, leaves dark green with white lines along primary and secondary veins adaxially . . . . . *N. driesslei*
4′. Corolla pink, orange, or red, never yellow, leaves without white line along veins or, if with white veins, then lamina bright green and flowers bright red (only *N. tingomariensis*, occasionally) 5
5(4). Inflorescence with large, sessile, semi-amplexicaul bracts; petals very deeply cymbiform and bright red; corolla balloon-shaped, rarely half spreading . . . . . *N. olmosiana*
5′. Inflorescence with petiolate or sessile bracts, these not semi-amplexicaul; petals variable in shape and color, often orange or pink; corolla campanulate or star-shaped, never balloon-shaped 6
6(5). Lamina very densely pubescent, velvety to the touch with numerous stinging hairs between the trichomes; vegetative shoots with numerous, mostly spirally inserted leaves (rarely opposite); stiffly erect, sparsely branched shrub; floral scales yellow with orange nectar sacs and apically with filaments . . . . . *N. urentivelutina*
6′. Lamina hairy and sometimes densely so, but never velvety to the touch; leaves never spirally inserted, opposite, internodes > 3 cm; plant often branched from base; floral scales red or yellow, nectar sacs not contrastingly colored 7
7(6). Leaves approximately as long as wide, dark green callus below insertion of petiole present; petals either very narrow (5–6 × as long as wide) or widely ovate, carnose and completely esetulose on back; capsule cla-

vate, erect on post-anthetically elongating pedicel 8
7′. Dark green callus below insertion of petiole absent; petals not narrow (< 4 × as long as wide); capsule variable in shape, but pedicel never elongating post-anthetically 10
8(7). Petals ovate (< 4 × as long as wide), carnose . . . . . *Nasa sagasteguii*
8′. Petals linear (5– > 6 × as long as wide), membranaceous 9
9(8). Leaves ovate, up to 90 × 50 mm; found in Piura . . . . . *Nasa solata*
9′. Leaves widely ovate to subcircular, 90–150 mm long and wide; Cajamarca . . . *Nasa dillonii*
10(7). Corolla brilliant red, inside of petals densely glandular distally; soft-stemmed rain forest herb with widely ovate leaves 100–180 mm long and wide, found below (2000–)1000 m . . . . . *N. tingomariensis*
10′. Characters not as above, leaves smaller, found only above 2200 m 11
11(10). Petals half-spreading and corolla star-shaped; floral scales white or pale yellow 12
11′. Petals erect and corolla campanulate; floral scales white, pale yellow, orange, or deep pink 13
12(11). Sparsely branched, stiffly erect herb with few to many yellow to red setae on stem and leaf veins; petals pink, half-spreading; Cajamarca: Bambamarca & Cutervo . . . . . *Nasa carnea*
12′. Much-branched stoloniferous herb or subshrub with numerous yellow to red setae on stem and leaf veins; petals orange; La Libertad: Bolívar . . . . . *Nasa stolonifera*
13(12). Erect shrubs; capsule turbinate to clavate, 2–2.5 × as long as wide; Cajamarca, Lambayeque, Piura 14
13′. Erect herbs or scandent shrubs; capsule globose or shortly turbinate, 1–1.5 × as long as wide; Amazonas, Pasco, Huánuco, San Martín 15
14(13). Leaves widely ovate, ca. 1.2–1.5 × as long as wide with 2 to 3 leaf lobes on each side; stem and pedicels densely glandular; petals orange; Lambayeque: Ferreñafe . . . . . *Nasa lambayequensis*
14′. Leaves ovate, ca. 2 × as long as wide with 5 to 7 lobes on each side; stem and pedicels sparsely glandular; petals pink; Cajamarca: San Miguel . . . . . *Nasa pongalamesa*
15(13). Erect herb with soft stems (collapsing upon drying); sepals 10–13 × 4.5–7 mm; petals 30–37 mm long, narrowly ovate, apically acuminate, deeply cymbiform, membranaceous; plant very densely covered with setae; Pasco, Junin . . . . . *N. pascoensis*
15′. Subscandent shrub with lignescent stems (not collapsing upon drying); sepals 8–10 × 2–4 mm; petals < 25 mm long, oblong, apically rounded, shallowly cymbiform to ± planar; plants sparsely setose to nearly esetulose 16
16(15). Petals widely ovate, dorsally with numerous red setae, membranaceous; Amazonas . . . . . *N. nubicolorum*
16′. Petals oblong, apically rounded, without setae, carnose; Huánuco, San Martín . . . *N. lenta*

1. Nasa lambayequensis Weigend, sp. nov. TYPE: Peru. Dept. Lambeyeque: Province Ferreñafe, Incahuasi, to Laguna Tembladera, 3000 m, 13 Sep. 1985, *A. Sagástegui A., D. Skillman, J. Mostacero & L. Ramírez 12872* (holotype, HUT; isotypes, F, MO). Figures 1, 3.

Haec species *N. pongalamesae* affinis, sed ab ea foliis late ovatis ambobus lateribus lobis 2 vel 3 instructis (nec anguste ovatis ambobus lateribus lobis 5–7 instructis), corolla aurantiaca (nec rosea) atque caule apicem versus dense (nec parce) glanduloso differt.

Strictly erect shrub up to 1.5 m tall; stem filled with white pith, to 0.5 cm diam., densely covered with red-brown setae to 3 mm long and scabrid hairs, young parts of the plant and pedicels very densely covered with uniseriate, gland-tipped, white trichomes consisting of 2 to 5 cells each. Leaves opposite, petioles 30–45 mm long, densely setose; lamina ovate, 50–75 × 50–65 mm, membranaceous, base shallowly cordate (sinus 4–6 mm deep), apex acuminate, margin lobed with 2 to 3 widely triangular lobes on each side, each 10–15 × 17–20 mm, lobe margin serrate; abaxial surface setose on veins, otherwise covered with scabrid-glochidiate hairs (0.7–1 mm), adaxial surface densely setose and densely covered with longer scabrid hairs (ca. 1 mm); venation pinnate with 2 to 3 lateral veins on each side. Inflorescence a terminal monochasium, rarely dichasium, 10–20 cm long, with 5 to 8 pendent flowers, bracts subsessile, up to 30 × 12 mm; pedicel 20–40 mm long. Calyx very densely setose, tube conical to ovoidal, 5–6 × 5 mm, calyx lobes 5, ovate-acuminate, 12–14 × 5 mm, densely setose and covered with scabrid trichomes on the outside; corolla widely campanulate; petals obovate, cymbiform, 18–22 × 10 mm, apex rounded to slightly acuminate, abruptly widening ca. 5 mm from base, densely setose and set with scabrid and glochidiate hairs on back, with gland-tipped, 3-celled uniseriate trichomes, orange; nectar scales 5, with rectangular back, 8 × 2 mm, base incurved, basally on back with two depressed globose sacs 2 mm diam., pale red, scale neck slightly thickened, recurved and deeply red, without filiform appendages, laterally protracted into 2 incurved, suberect wings 4 × 1.5 mm; staminodia 2 per scale, 7 mm long, base dilated, 1 mm wide, filiform above, base curved, papillose, pale yellow; stamens numerous, in 5 epipetalous fascicles of 12 to 14 each; filaments 12 mm long, white, anthers 1 × 0.5 mm, black. Capsule clavate, crowned with the persistent calyx lobes, pedicel erect, 25–35 mm long, capsule 20–25 × 10 mm, very densely red setose, covered with very short, white, glochidiate

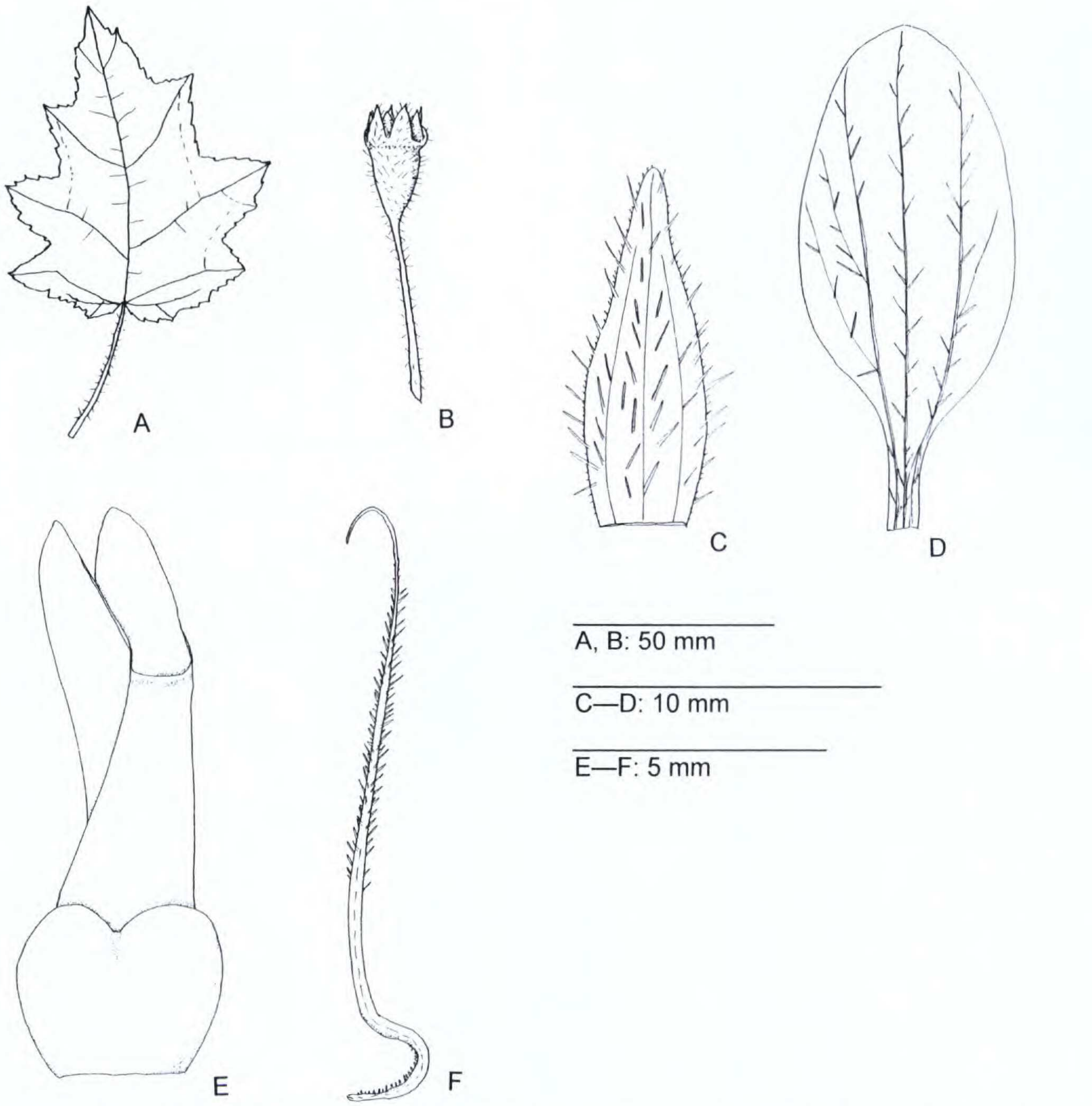

Figure 3. *Nasa lambayequensis* Weigend. —A. Leaf. —B. Capsule. —C. Sepal. —D. Petal. —E. Floral scale. —F. Staminode, lateral view. (Drawn from *Sagástegui et al. 12872*, HUT.)

and scabrid trichomes and uniseriate, gland-tipped trichomes, opening with 3 apical valves; seeds numerous, ovoid, testa reticulate.

Nasa lambayequensis has been collected in flower and fruit in August and September, but is likely to show peak flowering toward the end of the rainy season in late April and May; no detailed field data are so far available. *Nasa lambayequensis* is evidently closely allied to *N. pongalamesa* described below. They share the shrubby, poorly branched habit and grow in similar situations along rocks and dry stone walls in jalca (dry paramo of Peru) habitats. It differs from *N. pongalamesa* and closely allied *N. carnea* in leaf shape (widely ovate with 2 to 3 lateral lobes vs. ovate blades with more than 4 lateral lobes), petal color (orange vs. pink), and its much denser glandular indument. Both *N. pongalamesa* and *N. lambayequensis* are segregates of *N. carnea* (Urban & Gilg) Weigend s.l. (sensu Weigend, 2000a), and the material here referred to the new species was previously treated under that taxon. The three taxa are allopatric, with both new species found on the western slope of the Andes, while *N. carnea* is restricted to inner Andean valleys in the Central Cordillera (centered around Dept. Cajamarca, Prov. Bambamarca). The northern specimens of what now remains in *N. carnea* (e.g., Dept. Cajamarca, Prov. Cutervo) remain problematical, and field studies will be required to clarify where they actually belong, since the available herbarium material is unsatisfactory.

Paratypes. PERU. **Dept. Lambeyeque:** Prov. Ferreñafe, between Incahuasi and Sinchihual, 3000 m, 25 Aug. 2000, *A. Sagástegui A. & M. Zapata 16279* (HAO, HUT, M).

2. Nasa pongalamesa Weigend, sp. nov. TYPE: Peru. Dept. Cajamarca: Prov. San Miguel de Pallaques, Road Agua Blanca to Oyotun, pass height "Ponga la Mesa," 3500–3600 m, 14 Oct. 2000 (cultivated in Berlin since Sep. 2002), *M. Weigend, H. Förther, N. Dostert & E. Rodriguez R. 2000/752C* (holotype, USM; isotypes, BM, BSB, HUT, M, MO, NY, W). Figures 1, 2, 4.

Haec species *N. carneae* affinis, sed ab ea habitu fruticis rigide erectis (nec herbae arcte ramosae), squamis nectariferis roseis (nec luteolis) et corolla campanulata (nec stellata) differt.

Strictly erect shrub 1–2 m tall; stem filled with white pith, to 1.5 cm diam., densely covered with reddish brownish setae to 3 mm long and scabrid hairs, young parts of the plant and pedicels with scattered to many uniseriate, gland-tipped, white trichomes consisting of 2 to 5 cells each. Leaves opposite, petioles 30–55 mm long, densely setose; lamina ovate, 100–170 × 50–70 mm, membranaceous, base shallowly cordate (sinus 3–5 mm deep), apex acuminate, margin lobed with 5 to 7 widely triangular lobes on each side, each 7–12 × 15–18 mm, lobe margin serrate; abaxial surface very densely setose on veins and covered with glochidiate hairs (0.5 mm), adaxial surface sparsely setose and densely covered with longer scabrid hairs (ca. 1 mm); venation pinnate with 3 to 5 lateral veins on each side. Inflorescence a terminal monochasium, rarely dichasium, 20–50 cm long, with 8 to 12 pendent flowers, bracts petiolate, up to 55 × 18 mm; pedicel ca. 20 mm long, calyx very densely setose, tube conical to ovoidal, 6–7 × 4 mm, calyx lobes 5, ovate-acuminate, 13–15 × 5 mm, densely setose and covered with scabrid trichomes on the outside; corolla widely campanulate; petals obovate, cymbiform, 20–25 × 15 mm, apex rounded to slightly acuminate, abruptly widening ca. 2 mm from base, setose and set with scabrid and glochidiate hairs on back, with gland-tipped, 3-celled uniseriate trichomes, pale pink; nectar scales 5, with rectangular back, 6 × 2 mm, base incurved, basally on back with two depressedly globose sacs 2 mm diam., pale red, scale neck slightly thickened, recurved and deeply red, without filiform appendages, laterally protracted into two incurved, suberect wings 3 × 2 mm wide; staminodia 2 per scale, 7 mm long, base dilated, 1 mm wide, filiform above, base curved, papillose, pale pink; stamens numerous, in 5 epipetalous fascicles of 12 to 14 each; filaments 12 mm long, white, anthers 1 × 0.5 mm, black. Capsule clavate, crowned with the persistent calyx lobes, pedicel erect, 25–35 mm long, capsule 25–30 × 10 mm, very densely black setose and covered with very short, white, glochidiate trichomes, opening with three apical valves. Seeds numerous, ovoid, testa reticulate.

Nasa pongalamesa was encountered in fruit in October 2000, i.e., in the middle of the dry season. Like most species of *Nasa* in the region, it likely flowers March to May at the end of the rainy season.

Nasa pongalamesa is closely allied to three other species, *N. carnea* (Urban & Gilg) Weigend, *N. urentivelutina* Weigend (Weigend, 2000), and *N. lambayequensis* (see above). It differs from *N. carnea*, e.g., by the stiffly erect habit and perennial growth form with a strongly lignified stem, a very dense cover with dark red-brown stinging hairs (vs. stinging hairs scattered, pale brown), and the presence of stinging hairs on the back of the petals. *Nasa urentivelutina* differs in apricot-colored petals (vs. pink), densely spiral phyllotaxis (vs. opposite leaves), and a much more strongly branched habit (shrubs may be as large as 2 × 1.5 m). Its floral scales have a back that is very strongly narrowed above the nectar sacs and ends in three apical filiform appendages, whereas the scales of *N. pongalamesa* are only slightly narrowed above the sacs and have no filiform appendages.

The new species is also ecologically clearly differentiated: It grows on an exposed ridge with strong cloud condensation at an elevation of ca. 3500 m between rocks in otherwise grassy puna vegetation. *Nasa carnea*, on the other hand, grows in shrub forest in inner Andean valleys at ca. 2200–3000 m, and *N. urentivelutina* is restricted to dry scree slopes in full sun at elevations below 3000 m. *Nasa pongalamesa* is thus the species of *Nasa* ser. *Alatae* that reaches the highest elevation so far known from this group and is found together with a species of the *N. cymbopetala* group, the typical puna group in the genus.

Nasa pongalamesa was found in fruit only in October 2000 and was then brought into cultivation in the greenhouses of the Institute of Biology in Berlin. The type specimens were prepared from the cultivated material when it came into flower. *Nasa pongalamesa* is named after the locality of the original collection, "Ponga la Mesa" (lay the table). The epithet is here used as a noun in apposition, with its spelling not changed, sensu Article 23.5. of the ICBN (Greuter et al., 2000).

Paratypes. PERU. **Dept. Cajamarca:** Prov. San Miguel de Pallaques, road Agua Blanca to Oyotun, pass height "Ponga la Mesa," 3500–3600 m, 14 Oct. 2000, *M. Weigend et al. 2000/752* (BSB, HUT, M, USM).

Figure 4. *Nasa pongalamesa* Weigend. —A. Habit. —B. Flowering monochasium. —C. Sepal. —D. Petal. —E, F. Floral scale, dorsal and lateral view. —G, H. Staminode, lateral and dorsal view. (Drawn from *Weigend et al. 2000/725-C*, BSB.)

3. Nasa stolonifera Weigend, sp. nov. TYPE: Peru. Dept. La Libertad: Prov. Bolívar, road from Balsas (on the Marañon river) to the city of Bolívar, km 100 from Balsas, a few kilometers before Bolívar, remnant of *Alnus acuminata* forest in ravine with permanent water course, in deep, humus rich soil, 07°07′53″S, 077°44′30″W, 17 Oct. 2000, *M. Weigend, H. Förther, N. Dostert & E. Rodriguez R. 2000/822* (holotype, USM; isotypes, BSB, HUT, M). Figures 1, 5.

Haec species *N. driessleae* affinis similisque, sed ab ea foliis sine striis albis, caule bene evoluto et corolla aurantiaca (nec pallide flava) differt.

Erect to ascending herb 0.6–1.3 m tall, stem terete, filled with white pith, to 0.5 cm diam., densely set with yellow to pale red setae 1–3 mm long and densely covered with scabrid hairs, eglandular; underground stolons 10–30 cm long present, pale yellow, pubescent, forming new flowering shoots. Leaves opposite, petioles 32–45 mm long, setose; lamina widely ovate, 100–130 × 55–90 mm, membranaceous, base subtruncate (sinus < 2 mm deep), apex acuminate, margin lobed with 5 to 7 widely triangular lobes on each side, each up to 13 × 30 mm, lobe margin irregularly serrate to denticulate; abaxial surface setose on veins and covered with numerous scabrid hairs (0.2 mm), adaxial surface setose on veins and densely covered with longer scabrid hairs (0.3 mm); venation pinnate with 3 to 5 lateral veins on each side. Inflorescence a terminal monochasium 15–20 cm long, with up to 6 pendent flowers, bracts petiolate, lamina ovate, up to 35 × 15 mm; pedicel 15–20 mm long; calyx densely setose, tube conical, 5 × 5 mm, calyx lobes 5, narrowly triangular-ovate, 13–15 × 3–4 mm near base, densely setose and covered with scabrid trichomes on the outside; corolla half spreading; petals narrowly oblong, cymbiform, 18–20 × 7–8 mm, apex acuminate, without triangular teeth, setose and sparsely set with scabrid and glochidiate hairs on back, densely set with gland-tipped, 3-celled uniseriate trichomes, especially along the margins, orange-red; nectar scales 5, with rectangular back, 8–9 × 3 mm, base incurved, basally on back with two indistinct, depressedly globose sacs 3 mm diam., yellow, scale neck not thickened, without appendages, laterally protracted into two incurved, horizontal wings 3 × 1 mm; staminodia 2 per scale, 11 mm long, base dilated, 1 mm wide, filiform above, base and tip curved, papillose, white; stamens numerous, in 5 epipetalous fascicles of 12 to 14 each; filaments 12–15 mm long, white, anthers 2 × 1.5 mm black. Fruit not seen.

Only known from the type collection.

Nasa stolonifera was in full flower when collected in October 2000, i.e., in the middle of the dry season. It probably flowers and fruits throughout the year in this permanently moist region.

This new species of *Nasa* has no clear close allies in the genus. It has well-developed underground stolons and forms large, clonal stands in the remnants of montane *Alnus* forests in the province of Bolívar. The presence of underground stolons is a very rare character in *Nasa* and otherwise found in *Nasa limata* (Killip) Weigend, which is generally considered a member of *Nasa* ser. *Grandiflorae* and differs in flower morphology and color (flowers dark orange and nectar scales dark crimson), indument, and leaf morphology. The dense trichome cover is remotely reminiscent of *Nasa urentivelutina*, which grows just on the other side of the Marañon river, but that species has different nectar scales and alternate leaf arrangement, and is a stiffly erect, nonstoloniferous shrub. Perhaps the closest relative of *N. stolonifera* is *N. driesslei* Weigend, which grows just a little bit further north (Province Chachapoyas) in a similar type of environment, but differs, e.g., in clear yellow flowers and a white central line on the leaf blade. The name "stolonifera" refers to the presence of underground stolons.

4. Nasa victorii Weigend, sp. nov. TYPE: Peru. Dept. San Martín: Prov. Huállaga, District Saposoa, between El Tambo and Jalca del Rayo, low cloud forest, 2500–3200 m, 15 Sep. 2000, *V. Quipuscoa S., S. Leiva G. & Y. Díaz 2480* (holotype, HUT; isotypes, BSB, F, HAO, HUSA, MO). Figures 1, 6.

Haec species *N. anderssonii* affinis, sed ab ea ovario basi trichomatibus urentibus instructo (nec omnino trichomatibus urentibus carente) et habitu fruticis scandentis (nec herbae rigide erectae), ab omnibus speciebus ceteris Loasacearum caule costis longitudinalibus elevatis instructo differt.

Erect to ascending shrub 0.6–2 m tall; stem terete with typically 6 elevated longitudinal ridges, with white pith, to 1.5 cm diam., with very few reddish brown setae 1–3 mm long and densely covered with minute scabrid hairs < 0.2 mm long, eglandular. Leaves opposite, petioles 40–65 mm long, very sparsely setose; lamina widely ovate, 100–150 × 60–90 mm, membranaceous, base subtruncate (sinus < 2 mm deep), apex long acuminate, margin lobed with 5 to 7 indistinct, triangular lobes on each side, each up to 5 × 15 mm, lobe margin serrate to serrate-denticulate; abaxial surface with scattered setae on veins and covered with numerous scabrid hairs (< 0.2 mm), adaxial sur-

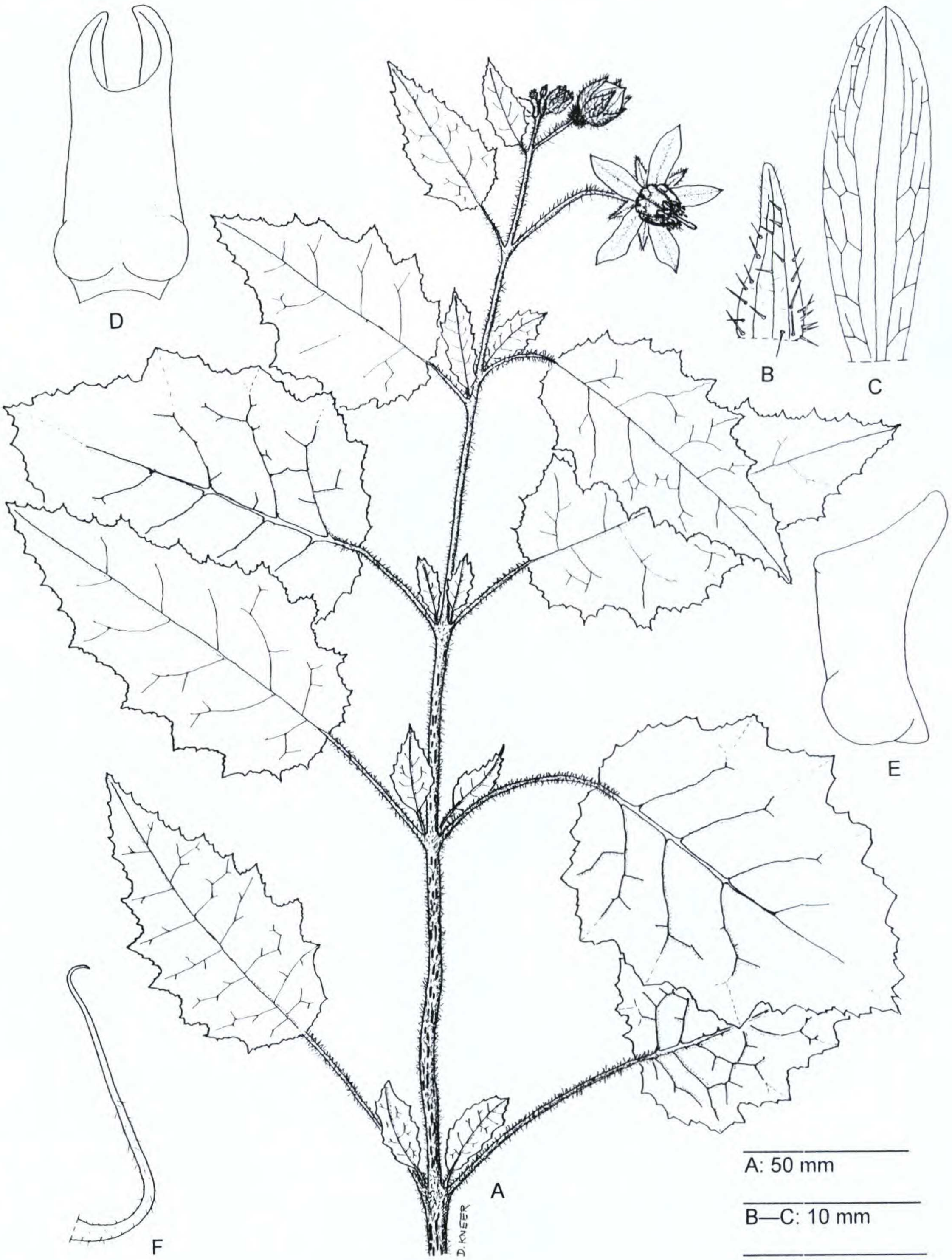

Figure 5. *Nasa stolonifera* Weigend. —A. Habit. —B. Sepal. —C. Petal. —D, E. Floral scale, dorsal and lateral view. —F. Staminode, lateral view. (Drawn from *Weigend et al. 2000/822*, BSB.)

Figure 6. *Nasa victorii* Weigend. —A. Habit. —B. Single flower. —C. Sepal. —D. Petal. —E. Floral scale, lateral view. —F. Staminode, dorsal view. (Drawn from *Quipuscoa et al. 2480*, BSB.)

face very sparsely setose on veins and densely covered with short scabrid hairs (< 0.3 mm); venation pinnate with 3 to 5 lateral veins on each side. Inflorescence a terminal monochasium 15–20 cm long, with up to 6 pendent flowers, bracts petiolate, lamina ovate, up to 55 × 20 mm; pedicel 20–40 mm long; calyx setose only at the base, tube subglobose, 5 × 5 mm, calyx lobes 5, narrowly triangular-ovate, ca. 10 × 3–4 mm, densely setose and densely covered with short scabrid trichomes on the outside; corolla widely campanulate; petals obovate, shallowly cymbiform, 15 × 11 mm, apex

rounded, without triangular teeth, esetulose and densely set with short scabrid hairs on back, eglandular, orange-red; nectar scales 5, with rectangular back, 8 × 3 mm, base incurved, basally on back with 2 indistinct, depressedly globose sacs 3 mm diam., yellow, scale neck not thickened, without appendages, laterally protracted into 2 incurved, horizontal wings 3 × 2 mm; staminodia 2 per scale, 13 mm long, base dilated, 1 mm wide, filiform above, base and tip curved, papillose, white; stamens numerous, in 5 epipetalous fascicles of 12 to 14 each; filaments 12–15 mm long, white, anthers 2 × 1.5 mm, black. Capsule subglobose, ca. 20 mm diam., with setae only in proximal part and covered with numerous very short, white, scabrid trichomes, opening with 3 apical valves. Seeds numerous, ovoidal, testa reticulate.

Nasa victorii probably flowers and fruits sporadically throughout the year, since its habitat does not experience a marked dry season. It has been collected with flower buds in September and with flowers and fruits in September.

While most species of *Nasa* are readily recognized, *N. victorii* is certainly one of the most readily identifiable taxa. Its stems with longitudinal ridges are unique not only in the species group, but in the entire family Loasaceae. The species is a subscandent to scandent shrub in dense, wet cloud forest on the eastern slope of the Andes, a notoriously poorly known region. Like *N. nubicolorum* from the same general region (Weigend, 2000a) it grows in deep leaf litter and humus in extremely wet habitats. The species is now known from two collections in the department San Martín, but may be more widespread in this inaccessible region. Like most species of the group it is likely to be sensitive to habitat alteration and therefore vanishes rapidly from areas as they become accessible to civilization.

Its sparse indument is reminiscent of *Nasa anderssonii*, which is known from the Cordillera Colán in Peru and also neighboring Ecuador, but it differs from that taxon, e.g., in stem and flower morphology, and habit. *Nasa victorii* is named in honor of Victor Quipuscoa Silvestre (HUSA, Arequipa, Peru).

Paratypes. PERU. **Dept. San Martín:** Prov. Rioja, road from Pedro Ruiz to Rioja, between La Esperanza and Nuevo Cajamarca, near km 377, 2000–2300 m, 05°42′09″S, 077°48′27″W, 21 Oct. 2000, *M. Weigend et al. 2000/929* (BSB, HUT, M, USM).

New Record

5. Nasa amaluzensis (Weigend) Weigend, Monogr. Syst. Bot. Missouri Bot. Gard. 75: 954. 1999. *Loasa amaluzensis* Weigend, Bot. Jahrb. Syst. 118: 264. 1996. TYPE: Ecuador. Loja: 26.4 km S of Amaluza on road to Zumba, river valley, 2800 m, *S. Clemants 2392* (holotype, QCA; isotype, QCNE). Figure 1 (see also Weigend, 2000b: fig. 16J–R).

Nasa amaluzensis apparently flowers during the wet season (January to April) and probably fruits from April onward, like most species of *Nasa* from the western part of the Andes.

Nasa amaluzensis was described from a single collection from the extreme south of Ecuador in 1996. Material exactly matching the type has now been collected by S. Leiva G. in the extreme north of Peru, so that this species is now known from both countries. *Nasa amaluzensis* shows clear affinity to *Nasa loxensis* from Ecuador (it shares horizontally inflexed wings on its nectar scales, and cymbiform, setose petals), but differs in distally densely glandular stems and pentagonous leaves with acute leaf lobes. Its closest geographical neighbors are *Nasa solata* (leaves ovate, petals linear), *N. sagasteguii* (similar leaf shape but with ovate leaf lobes, carnose, esetulose petals), and *N. glabra* (plant virtually esetulose, carnose, esetulose petals).

Material examined. ECUADOR. **Prov. Loja:** 26.4 km S of Amaluza on road to Zumba, river valley, 2800 m, *S. Clemants 2392* (QCA, QCNE). PERU. **Dept. Piura:** Prov. Ayavaca, Cerro Aypate, 2650 m, 10 Jan. 2002, *S. Leiva G. 2632* (BSB, F, HAO, HUT).

Acknowledgments. I express my sincere gratitude to Dominik Kneer (Berlin, Germany) for the preparation of the drawings and to Katja Weigend (Berlin) for the preparation of the photographic plate. I also thank E. Rodriguez R. (HUT), S. Leiva G. (HAO), Victor Quipuscoa S. (HUSA), and A. Cano E. (USM) for providing valuable collections, and N. Dostert (Berlin) and H. Förther (both Munich) for their assistance during fieldwork. I thank the curators and directors of the following herbaria for access to and loans of specimens: F, HAO, HUT, M, MO, USM. Part of the studies was supported by the Deutscher Akademischer Austauschdienst, the Deutsche Forschungsgemeinschaft, and **botconsult** GmbH (Berlin), which are here gratefully acknowledged.

Literature Cited

Ayers, T. 1999. Biogeography of *Lysipomia* (Campanulaceae), a high elevation endemic: An illustration of species richness at the Huancabamba Depression, Peru. Arnaldoa 6: 13–28.

Berry, P. E. 1982. The systematics and evolution of *Fuchsia* sect. *Fuchsia* (Onagraceae). Ann. Missouri Bot. Gard. 69: 1–198.

Endress, P. K. 1996. Diversity and Evolutionary Biology

of Tropical Flowers, 2nd ed. Cambridge Univ. Press, Cambridge, U.K.

Greuter, W., J. McNeill, F. R. Barrie, H. M. Burdet, V. Demoulin, T. S. Filgueiras, D. H. Nicolson, P. C. Silva, J. E. Skog, P. Trehane, N. J. Turland & D. L. Hawksworth (editors). 2000. International Code of Botanical Nomenclature (Saint Louis Code). Regnum Veg. 138.

Urban, I. & W. Gilg. 1900. Monographia Loasacearum. Nova Acta Caes. Leop.-Carol. German. Nat. Cur. 76(1): 1–368.

Weigend, M. 1999. Loasaceae. *In* P. M. Jørgensen & S. León-Yánez (editors), Catalogue of the Vascular Plants of Ecuador. Monogr. Syst. Bot. Missouri Bot. Gard. 75: 537–539, 954–955.

———. 2000a. A revision of the Peruvian species of *Nasa* ser. *Alatae* (Loasaceae). Nordic J. Bot. 20: 15–32.

———. 2000b. 132. Loasaceae. *In* G. Harling & L. Andersson, Flora of Ecuador 64.

———. 2002a. Observations on the biogeography of the Amotape–Huancabamba Zone in northern Peru. *In:* K. Young et al., Plant Evolution and Endemism in Andean South America. Bot. Rev. (Lancaster) 68: 38–54.

———. 2002b. *Nasa panamensis*, a new species of *Nasa* (Loasaceae) from Central America. Bot. Jahrb. Syst. 124: 211–216.

Young, K. R. & C. Reynel. 1997. Huancabamba Region, Peru and Ecuador. Pp. 465–469 *in* S. D. Davis, V. H. Heywood, O. Herrera-MacBryde, J. Villa-Lobos & A. C. Hamilton (editors), Centers of Plant Diversity, a Guide and Strategy for their Conservation, Vol. 3. The Americas. IUCN Publications Unit, Cambridge.